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Net-centric Warfare: Are We Ready to be Cyber-Warriors?

By

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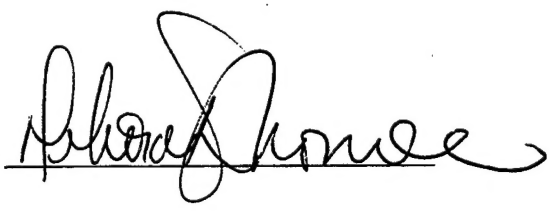
A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: 

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Abstract of

NETWORK CENTRIC WARFARE:
ARE WE READY TO BE CYBER-WARRIORS?

Joint Vision 2010, the Chairman of the Joint Chiefs of Staff's template for future military operations, identifies information superiority as the linchpin of the emerging operational concepts of Dominant Maneuver, Precision Engagement, Focused Logistics and Full-Dimensional Protection. While the technical challenges to realizing these concepts are acknowledged, I contend the tasks required to successfully integrate the human and cultural side of Joint Vision 2010's information superiority are as daunting as any of the still-unsolved technical hurdles. Currently, the human element of technology-enabled warfare is not getting the attention it needs. The military must begin to examine whether current training and doctrine are sufficient to prepare operational commanders for the Chairman's vision of the future.

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Introduction

Joint Vision 2010, the Chairman of the Joint Chiefs of Staff's template for future military operations, identifies information superiority as the linchpin of the emerging operational concepts of Dominant Maneuver, Precision Engagement, Focused Logistics and Full-Dimensional Protection.[1] While the technical challenges to realizing these concepts are acknowledged, I contend the tasks required to successfully integrate the human and cultural side of Joint Vision 2010's information superiority are as daunting as any of the still-unsolved technical hurdles. Currently, the human element of technology-enabled warfare is not getting the attention it needs. The military must begin to examine whether current training and doctrine are sufficient to prepare operational commanders for the Chairman's vision of the future.

The Future is Now?

A few forward thinkers, both in and out of the military, are just beginning to look at how information technology is changing the way we wage war. One of the new theories is coming from a surprising merging of minds:

> *According to Sun-tzu, victory belongs to the commander who gets the right information in a timely way: "Complex systems such as battle conditions are rich in information – information that must be acquired immediately."*
>
> *"War is such that the supreme consideration is speed"*[2]
>
> *Bill Gates, quoting Sun-tzu*
> *Business at the Speed of Thought*

[1] Joint Chiefs of Staff, Joint Vision 2010, (Washington, DC), 19.
[2] Bill Gates, Business at the Speed of Thought (New York: Warner 1999) 382.

Sun-tzu and Bill Gates may seem like an odd pairing, but in his latest book the master of the information age finds wisdom for today in the words of the ancient master of war. Gates believes that in business as in war, information and the speed at which it is acquired are key to victory. Thus, modern technology should be comfortably at home in an ancient profession – warfare. But how to translate Sun-tzu's philosophy into a modern electronic ethos remains a question. Gates foresees a new digital infrastructure emerging that functions like the human nervous system. He says:

> The biological nervous system triggers your reflexes so that you can react quickly to danger or need. It gives you the information you need as you ponder issues and make choices. You're alert to the most important things, and your nervous system blocks out the information that isn't important to you. Companies [and the military] need to have the same kind of nervous system–the ability to run smoothly and efficiently, to respond to emergencies and opportunities, to quickly get valuable information to the people...who need it, the ability to quickly make decisions and interact with customers [or opposing forces].[3]

But what happens to the human part of this digital nervous system as the operating environment evolves with the addition of technology? Will we find ourselves overwhelmed and unprepared for change?

In recent years, much time, money, and energy have been expended to study how a technology-enabled military-after-next will function. While Mr. Gates devotes a single chapter to this evolution, calling it "When Reflex is a Matter of Life and Death," the Chairman of the Joint Chiefs of Staff (CJCS) is staking the future of the military on enabling technology with Joint Vision 2010 (JV 2010). Since JV 2010 was published, there has been much service speculation about the possibilities that arise when

information technology is coupled with military acumen to achieve victory. Notable proponents include Naval War College President Vice Admiral Art Cebrowski, whose theory of network-centric warfare (NCW) is expanding the promise of JV 2010 into substantial naval experimentation and doctrine development. NCW, along with the Army's future doctrines, Force XXI and the Army After Next, and the Marine Corps' Advanced Warfighting Experiments (AWE), primarily look at how technology will improve the way we fight.

However, we must look beyond the hardware and software. These powerful and seductive "enabling-technologies" will affect far more than just the tools we use to fight. They will challenge the humans in the loop – for the heart of JV 2010's revolution is irrevocably altering the battlefield in ways our doctrinal futurists may not expect, or be prepared for.

Future Operational Environment

As the concept of 'war at the speed of thought' races forward, we must ask ourselves: What kind of operating environment do we face? In trying to characterize how this new technologically intense warfare will evolve, most futurists agree on a few universal themes. These include: the increased speed of command and operations, the need for decentralized control with more decisions to be made at lower-levels, and an imperative for greater situational awareness and flexibility. Interwoven throughout all these themes of change is an *absolute* dependence on information.

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[3] Ibid,xvii.

Joint Vision 2010 sees technology as "...providing decision makers with accurate information in a timely manner *[situational awareness]*..." allowing for a "...greater number of operational tasks to be accomplished faster *[speed of operations]*."[4] JV 2010 also maintains that through information superiority, warfighters at "...lower echelons will have the capability to control more lethal forces over larger areas, thus leveraging the skills and initiative of individuals and small units *[decentralized control]*."[5]

In writing about NCW, Vice Admiral Cebrowski describes this new environment in terms of "...a shift from attrition-style warfare to a much faster and more effective style characterized by the concepts of speed of command and self-synchronization."[6] NCW's speed of command has three parts:

(1) Information superiority, which means the warfighter will have "dramatically better" battlespace awareness, not just more data to sort through.

(2) This improving battlespace awareness leads to "...forces acting with speed, precision and reach to achieve a massing of effects rather than the massing of forces."[7]

(3) The acceleration of battlefield events will, in turn, limit enemy courses of action. Cebrowski believes this massing of effects "disrupts the enemy's strategy," hopefully stopping their actions before they start.[8]

NCW will thus change the operating environment by introducing self-synchronization, which is the ability of a well-informed force to organize and synchronize complex

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[4] Joint Chiefs of Staff, Joint Vision 2010, (Washington, DC), 13.
[5] Ibid, 15.
[6] VADM Arthur K. Cebrowski and John J. Garstka, "Network-Centric Warfare--Its Origin and Future, U.S. Naval Institute Proceedings, January 1998, 32.

warfare from the bottom up. The organizing principles are unity of effort, clearly articulated commander's intent, and carefully crafted rules of engagement.[9]

As we meld these common themes of future warfare, we can begin to build an operational framework. Commanders can expect to face a battlefield of unprecedented complexity. His or her ability to clearly articulate commander's intent will be of critical importance as improved situational awareness allows more operational decisions to be made at the tactical level. The commander will also have to be prepared to deal with operations unfolding at an ever-increasing rate. The ability to quickly make good decisions and the ability to adapt to rapid change are essential traits for future leaders. Given that current doctrine and training emphasize traditional hierarchical command structures and standard operating procedures, there is obviously a mismatch between what commanders are now taught and the skills they will need in the future.

The Search for Answers

The Marine Corps is leading the search for ways to adapt to future battlefield challenges in a series of advanced warfighting experiments (AWE). In the first, Hunter Warrior, experimentation focused on developing better command and control, with an emphasis on speed and efficiency.[10] For the second, Urban Warrior, the Marine's Experimental Combat Operations Center (ECOC) was functionally organized to aid the

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[7] Ibid.

[8] Ibid.

[9] Self-Synchronization is the ability of a well-informed force to organize and synchronize complex warfare activities from the bottom up. The organizing principals are unity of effort, clearly articulated commander's intent, and carefully crafted rules of engagement. Self-Synchronization is enabled by a high level of knowledge of one's own forces, enemy forces, and all appropriate elements of the operating environment. It overcomes the loss of combat power inherent in top-down command directed synchronization characteristics of more conventional doctrine and converts combat from a step function to a high-speed continuum.

operational commander by providing more rapid planning and decision making. The centerpiece of the new ECOC was an information network that improved situational awareness through a common operating picture (COP). The experiment's results suggest the COP would allow an operational commander to react and synchronize his plans in real-time within the operational battlespace.[11]

The Marines also recognized that with the COP comes decentralized control, which makes the squad leader a key individual. The focus at the this level during Hunter Warrior was not only on technology and tactics, but also on the training of the human being involved. Squad leaders went through a course called "Clear Thinking."[12] The aim was to "...promote an aggressive opportunism enabling the squad leader to follow and apply the commander's intent." The training emphasized pattern recognition, problem definition, and risk assessment. While immature technology limited the COP at the tactical level during Hunter Warrior, the "Clear Thinking" training was deemed a success. This underscores the value of the human part of the future battlefield equation. Even with limited information, an adaptive individual with the right decision making skills and clear intent will function better.

The concepts of Hunter Warrior were explored further in Urban Warrior, the second Marine Corps AWE. In March 1999, the Marines invaded Oakland, California, in a full-scale test of technologically enhanced military operations. The ECOC for the exercise, the *USS Coronado* anchored off San Francisco, was described as looking like

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[10] USMC Marine Corps Warfighting Laboratory, Hunter Warrior, Quantico, April 98, 8.
[11] Ibid.
[12] Ibid.

the "bridge of the Starship Enterprise" with its gray paint and computers.[13] Colonel Robert E. "Rooster" Schmidle, commander of the attack force, acknowledged both the importance of the technology and of the human element. Both Schmidle and the Washington Post's Joel Garreau, who has been reporting on the Marine AWEs, see humans as eminently adaptable to the new high-speed information world, and argue the whole of human and computer brains are greater than the sum of their parts:

> When we're busy and things are really percolating, there's guys leaning over computers and they're yelling back and forth at each other. There's kind of a hum that starts in the COC when it's starting to operate as an entity unto itself. Yeah, they are alive. And when they're alive they...think things. You know, it's groupthink, but it's not groupthink in a bad way. When we talk about being on the same wavelength, that's what we're talking about.[14]

> [T]he real lessons were rarely about gear. They were about psychology. What the Marines repeatedly came away with were new insights into how humans must behave to thrive in the chaos and speed of the 21st century. They also gained a new reverence for adaptability and innovation.[15]

Hunter Warrior demonstrated the decentralized effect that Vice Admiral Cebrowski postulated in his NCW concept. With technology increasing the speed of operations, the Marines did not have time to let the classic Marine hierarchical command style run its course Instead, the commander, faced with problems that would normally take months to solve, sent his executive officer into Monterey as 'the forward command element' with one simple task: look for problems and come up with solutions.[16] Supported by the COP concept, this first step in the decentralization of battlefield control worked. Colonel Schmidle observed afterwards, "I believe that

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[13] Joel Garreau, "Reboot Camp: As War Looms, the Marines Test New Networks of Comrades," Washington Post, March 24, 1999, C01.
[14] Ibid.
[15] Ibid.

individuals matter. That a certain individual at a certain point changes the course of everything that occurs. It's the great-man theory of history."[17]

In applying great-man theory to the operational level commander, the Marines acknowledge that not everyone has the ability to excel in this new warfighting paradigm.

> The increasing significance of information technologies in combat operations centers places greater emphasis on battle watch captains to assimilate information and make rapid, correct decisions in an environment of uncertainty. This skill in maintaining situational awareness and recognizing new patterns requires special decision making skills.[18]

In an effort to find those commanders with the skills necessary to meet the new challenges, Urban Warrior looked at a number of screening techniques that would identify them. The AWE also expanded Hunter Warrior's "Clear Thinking" training from the tactical to the operational level. How successful were the new approaches to identifying and training leaders? The formal report on Urban Warrior is still being compiled, but Joel Garreau who watched the exercise with an eye to human-technology match had this to say:

> Far and away the most important lessons the Marines learned were that while all our futures will include revolutionary technology, meant to unite us into human networks, the real challenge is not the technology. It's figuring out the human strategies, tactics, training and organization that will transform all those silicon wafers and batteries into effective human power.[19]

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[16] Ibid.
[17] Ibid.
[18] USMC Marine Corps Warfighting Laboratory, Urban Warrior, Quantico, April 98, 42.
[19] Joel Garreau, "Reboot Camp: As War Looms, the Marines Test New Networks of Comrades," Washington Post, March 24, 1999, C01.

Future Leaders

Using our new operational framework as a template, where a complex, fast paced battlefield will test an operational commander's ability to maintain situational awareness and to quickly made good decisions, we can now ask, what kind of leader fits into this environment? As the examples above clearly indicate, he or she must be intelligent, adaptable, communicative and capable of seeing the 'big picture.' A decentralized battlefield means more than delegation of authority to the tactical level. Rather, an operational commander must comprehend an ever-changing, increasingly complex battlespace and orchestrate tactical events for operational and strategic effect. Parallel, not linear thinking is required as real time information provides battle staffs with the ability to track multiple operational patterns. A commander needs to be able to see an emerging pattern, quickly discern what it means in terms of operational branches and sequels, and decide on a course of action. Given the increasing speed of command, the ability to make intuitive decisions becomes paramount. In writing about the Army After Next, Bernard Bass said one of our challenges with net-centric warfare will be balancing rationality and intuition."[20]

> The union of knowledge and speed will obviously increase the demands for decisive, transformational leadership, highly coordinated communications, keen diagnostic abilities and a buildup of intuition based on attention to and recall of a variety of relevant past learnings and experiences. A balance will need to be sought between the purely rational approach to problem solving and the intuitive. The emotional will have to be factored into intellectual solutions as well.[21]

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[20] Bernard M. Bass, "Leading the Army After Next," Fort Leavenworth Military Review, March/April 1998.
[21] Ibid.

So, are current operational commanders capable of achieving this balance, and do they have the other skills necessary to achieve excellence within our future battlefield framework? While not an absolute measure of a person's ability, it is beneficial to review research that looks at the predisposition of current operational commanders to certain personality traits. The Myers-Briggs Type Indicators (MBTI) test is one measure of how personality influences behavior. The MBTI identifies four pairs of preference alternatives:

Extraverted (E).....Introverted (I)
Sensing (S).....Intuitive (N)
Thinking (T).....Feeling (F)
Judging (J).....Perceiving (P)[22]

Remembering our future environment – a complex, fasted paced battlefield to test an operational commander's ability to maintain situational awareness and to quickly make good decisions – and without getting into excessive detail regarding the particularities of MBTI, we can isolate those traits which are likely to be most important for our future leaders. MBTI identifies four types of temperament work styles: NF, NT, SJ and SP.[23] Of these, in my opinion, one best captures the traits of a future operational commander. The NT type's strengths and how they relate to future operational theories include:

- A ready ability to see the big picture *(Speed of Command)*
- A talent for conceptualization and systems planning *(Situational Awareness)*

[22] Otto Kroeger and Janet M. Thuesen. Type Talk at Work (New York: Dell), 12.
[23] NF Strengths: A phenomenal capacity for working with people and drawing out their best; Being articulate and persuasive; A strong desire to help others; The ability to affirm others freely and easily. NT Strengths: A ready ability to see the big picture; A talent for conceptualization and systems planning; Insight into the internal logic and underlying principals of systems and organizations; The ability to speak and write clearly and precisely. SJ Strengths: Administration; Dependability; The ability to take charge; Always knowing who's in charge. SP Strengths: Practicality; Adept problem-solving skills, particularly at hands on tasks; Resourcefulness; A special sense of immediate needs. Ibid, 53-59.

- Insight into the internal logic and underlying principles of systems and organizations *(Self-Synchronization)*
- The ability to speak and write clearly and precisely *(Commander's Intent)*[24]

In the fall of 1998, students in the NWC's College of Naval Warfare (CNW) were given the MBTI. Interestingly, of the 211 people surveyed, only 28% fell into the NT category. The predominate temperament was SJ with 58%. The result is consistent with the last ten years of MBTI reporting on CNW students and reflects patterns in the military at large.[25] The SJ type's strengths, not surprisingly, include:

- Administration
- Dependability
- The ability to take charge
- Always knowing who's in charge[26]

All are traits that fit well into the traditional, hierarchical military culture. But how will this personality type fit into our future operational framework? One could easily conclude that it will not, but in doing so we would overlook the influence the existing military culture has on those individuals who live within it. Human nature requires adaptation to societal expectations. At this point in time, our military rewards leaders who understand the chain of command and know how to function as part of it – very much SJ behavior. But what if expectations were changed? What if the hierarchy is no longer the organizational benchmark? There are likely many closet NT's – intuitive thinkers – in the military, ready to step into the future if given the appropriate direction.

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[24] Ibid. 56.
[25] Charlie Anderson, Myers-Briggs Type Indicator: Implications for CWN/NCC Class of 1998-1999, United States Naval War College, September 1998.
[26] Otto Kroeger and Janet M. Thuesen, Type Talk at Work (New York: Dell), 57.

The Marine Corps believes that not everyone will be able to make the transition,[27] but for those who can, one issue remains. How do we prepare them for the battlefield of the future?

Recommendation

It will be interesting to see the results of Urban Warrior's 'Battle Captain' experiment as this data will serve as a guide for developing future operational commanders. But this development cannot continue in isolation. While the AWEs are truly groundbreaking efforts, the other services need to be moving in parallel with Marine Corps under a plan for joint experimentation. The question: Who should setting the guidelines and leading the way? The answer: The United States Atlantic Command (USACOM), the Secretary of Defense's executive agent for joint experimentation. USACOM's mandate is to support implementation of JV 2010 by developing a program of joint experimentation to include:

- The creation and exploration of new joint operational concepts
- Support, integration and leverage of CINC/service/agency experimentation programs to synchronize efforts and provide a joint context for experimentation
- To aggressively conduct and assess joint concepts and capabilities, and to recommend the most promising for implementation[28]

For USACOM, joint experimentation is further defined as "an iterative process of collecting, developing and exploring concepts to identify and recommend the best value-

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[27] USMC Marine Corps Warfighting Laboratory, Urban Warrior, Quantico, April 98, 42
[28] USACOM Joint Experimentation Brief < http://www.jwtc.acom.mil/public/papers/jointexp/sld002.htm> (15 May 1999).

added solutions for changes in doctrine, organization, training, material, leadership and people required to achieve significant advances in future joint operational capabilities."[29]

At first glance, there seems to be no reason for concern given that these guidelines recognize the need for changes in leadership and people. USACOM should be prepared to lead exploration into the human element of technology-enabled warfare. But initial impressions are deceiving. While recognizing that somewhere in the future it will have to deal with "information age ideas," USACOM's primary focus is on current operations.[30] The development of joint, combined and interagency capabilities and interoperability must be pursued, but are we being shortsighted? Are we guilty of practicing linear rather than parallel thinking? Instead of being singularly locked into the immediate requirements identified by the CINCs' Integrated Priority Lists, or of ignoring the often broad, vague concepts put forth by JV 2010, USACOM needs to strike a balance and define a unified vision for experimentation. Retired Navy Commander Alan Zimm calls this vision a "unifying paradigm" from which the services can explore what he calls "human-centric warfare."[31] While a much more difficult mission than one that rests within the known military culture, USACOM must meet the challenge if we are to successfully negotiate the pitfalls associated the changing command environment. ACOM must codify the future operational environment to include:

- Increased speed of command and operations
- Decentralized control
- Increasing situational awareness and flexibility
- The supremacy of information

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[29] USACOM Major Focus Areas < http//www.acom.mil/acomweb.nsi/MPA/OpenNavigator> (5 May 1999).
[30] Ibid.

The "unifying paradigm" must also identify those skills essential for future operational commanders to include:

- An ability to maintain situational awareness
- Pattern recognition
- Critical thinking
- Rapid risk assessment
- Ability to communicate clearly and concisely
- Rational and intuitive decision making

Conclusion

There is no doubt that the implication of change that accompanies concepts like net-centric and human-centric warfare can be disturbing for those who have dedicated their lives to the military as we now know it. But as the inevitable transformation leads us into uncharted waters, one notable military officer is not concerned. Paul K. Van Riper, former commanding general of the U.S. Marine Corps' Combat Development Command can envision a Marine Corps hierarchy so transformed by technology that it is unrecognizable.[32] But the potential for change does not trouble him because the Marine human network already exists under "all that encrusted hierarchy" welded together by two centuries of trust.[33]

> Marines generally have some unusual characteristics that bring them together. There is almost a religious fervor to what goes on. It's definitely instilled in recruit training. We don't understand it, but it's there. I don't think [technology-enabled warfare] will change the intangibles. It will shortchange the structure, and it will change what you need to do the job.

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[31] Alan D. Zimm, "Human-Centric Warfare," U.S. Naval Institute Proceedings, May 1999. <http://www.proceedings. org/Proceedings/Articles99/PROZimm.htm> (15 May 1999).
[32] Joel Garreau, "Point Men for the Revolution; Can the Marines Survive a Shift from Hierarchies to Networks?" Washington Post, March 06, 1999, A01.
[33] Ibid.

> But this idea of a religious order, I think that'll stay. That's the essence of the Marine Corps.[34]

I think this concept of 'essence' holds true for each service. There are service-unique traits that soldiers, sailors, airmen and marines learn from one generation to the next – traits upon which continuity and trust are built. As we become more dependent on computer networks to fight wars, this service essence will become increasingly important. Microchips may bring together the technology, but it is human beings, seamlessly working as teams, networked together by ideals and commitment, that will achieve victory.

[34] Ibid.

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